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## PROBLEMS FOR SOLUTION.

### ALGEBRA.

335. Proposed by L. E. DICKSON, Ph. D., The University of Chicago.

A person has \$1800 in notes payable \$18 monthly, bearing 10% interest. Find their present value if the interest is payable at the maturity of each note; also present value if interest is payable annually. [An actual business transaction.]

336. Proposed by V. M. SPUNAR, M. and E. E., East Pittsburg, Pa.

Evaluate the determinant

$$\Delta = \begin{vmatrix} a_1^2 & a_2^2 & a_3^2 & \dots & a_n^2 \\ a_2^2 & a_3^2 & a_4^2 & \dots & a_{n+1}^2 \\ a_3^2 & a_4^2 & a_5^2 & \dots & a_{n+2}^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_n^2 & a_{n+1}^2 & a_{n+2}^2 & \dots & a_{2n}^2 \end{vmatrix}$$

### GEOMETRY.

366. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Given the coordinates of the four vertices of the tetrahedron,  $(x_1, y_1, z_1)$ ;  $(x_2, y_2, z_2)$ ;  $(x_3, y_3, z_3)$ ;  $(x_4, y_4, z_4)$ : find volume and express it by a determinant.

367. Proposed by G. I. HOPKINS, A. M., Professor of Mathematics and Astronomy, Manchester, N. H.

Construct a triangle, having given the base, vertical angle, and difference of altitude and difference of other two sides.

367. Proposed by W. J. GREENSTREET, M. A., Stroud, England.

The tangents from a point  $A$  to a circle are bisected by a line  $XYZ$ , which cuts a chord in  $X$  and the tangents at its extremities in  $Y, Z$ . Show that  $XAY = XAZ$ , or  $XAY = \pi - XAZ$ . Also, reciprocate with respect to  $A$ .

### CALCULUS.

292. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Integrate the partial differential equation,  $x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = axy$ .

293. Proposed by V. M. SPUNAR, M. and E. E., East Pittsburg, Pa.

Find the length of the integral curve of the differential equation  $(y^2 x^3 + 2)dx - x^3 dy = 0$  between  $x_1 = 1$  and  $x_2 = 8$ .

294. Proposed by C. N. SCHMALL, New York City.

Examine the function,  $f(x) = \frac{(x-1)(x-2)}{(x-3)}$  and determine why its *minimum* value is *greater* than its maximum.